# Aerohive iBeacon Integration

iBeacons to Provide Advanced Insights and Mobile
Experience Personalization

Introduction

Location services and user tracking have become popular subjects in various verticals, but especially in retail. Recent advancements in this technology allow for greater insight into consumer and user behavior. Location-based services can provide users with information that is custom tailored to where they are, while giving businesses the ability to develop an interactive and personal relationship with their customers. Presence technology can take the relationship even further by giving businesses a more complete picture of who their prospective customers are and what they are interested in. The combination of affordable, scalable Wi-Fi and the introduction of Bluetooth proximity beacons, or iBeacons, has delivered these capabilities in an easy-to-deploy form, changing the way that mobile users can interact with their physical environment while delivering behavioral insights in real-time. The progression of proximity beacon technology enables organizations that deploy wireless networks to gather mobile device signals for more precise proximity and presence detection, analytics and event triggering. Aerohive Networks has integrated its Wi-Fi access points with Radius Networks' iBeacon-based technology to boost location-based services coupled with centralized visibility and configuration.

Through this partnership, Aerohive's cloud-managed Wi-Fi infrastructure optimizes how Radius Networks' RadBeacons – powered by iBeacon and AltBeacon technology – are deployed and managed in increasingly complex retail, education, hospitality and healthcare environments. Aerohive is leading the way in helping these organizations to improve business services and personalizing end- user experiences. These customized interactions and experiences, directly targeting individual end-users within a designated area, can help to foster real, measurable relationship with customers in a variety of situations and environments.
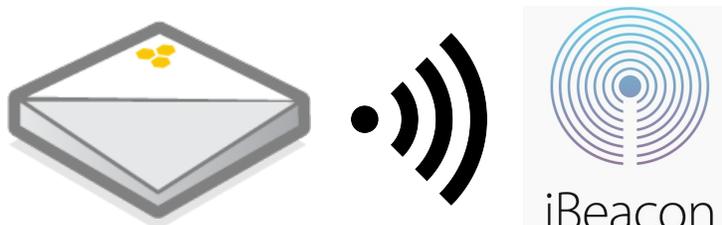
About Radius Networks

Radius Networks is a leading provider of mobile proximity technologies. Used by app developers, major retailers, restaurant chains, sports complexes and other enterprise facilities, Radius Networks generates customer traffic analytics to drive innovative customer engagements.

Radius' technologies leverage the wireless signals of mobile devices, including Wi-Fi, Bluetooth and GPS, to detect when visitors are in close proximity to important points-of-interest and use this information to provide a better understanding of customer shopping patterns and behaviors. This understanding enables businesses to engage customers in more meaningful and relevant ways. By combining these capabilities with Aerohive's advanced analytics and insights, companies can realize more detailed and accurate information about mobile device users in their facilities, as well as the products/services that they are interested in.

What are iBeacons?

A Beacon is a small apparatus that sends out a location ID and triggers an action on a mobile device—effectively helping a device understand its location and surroundings with a high degree of accuracy. Think of a "You are here" sign. Generically speaking, iBeacon is a protocol that runs on a hardware standard called BLE (Bluetooth Low Energy) which is a subset of Bluetooth. The transmissions are separate from general Wi-Fi signals (in order to limit interference) but still operate on the 2.4 Ghz spectrum. BLE devices are typically battery powered with an effective life measured in months and years.

RadBeacon USB

How do iBeacons work?

iBeacons focus on proximity, not absolute location- thus allowing the access points and iBeacons to determine a mobile clients' relative position without exact coordinates (which are often nearly impossible to determine via Bluetooth). Location is an absolute and unchanging concept – think latitude and longitude - while proximity answers the question of "what is nearby?" and is defined in relation to some other point – think next to the sale display or reference library. Proximity beacons can be used, however, to triangulate and infer a location relative to a point of interest.

iBeacons require an app on the end user device in order to function. This means that the privacy framework is inherently opt-in, since the end-user must install an app. iBeacons function as "one-way" devices, emitting transmissions but not capable of receiving signals. They transmit a proximity location identifier consisting of three numbers:

- Universal unique ID (UUID) = the brand (i.e. **Pet Supplies Plus**)
- Major number = the store (i.e. **Pet Supplies Plus store #122**)
- Minor number = a location in the store (**canine department**)

By transmitting these identifiers, a beacon can define a small area that devices react to. Those reactions can then be used to generate new applications and new interactions. A calibration constant is used to help estimate range. When powered on, the iBeacon configuration happens over the air and is protected by a PIN. Configurable components of iBeacons include:

- Universal Unique Identifier or UUID (16 bytes)

- Major Number (2 bytes)
- Minor Number (2 bytes)
- Advertisements per second (iBeacon prefers 100ms or 10x each second)
- Transmit power (0.01 w - 0.5 w)

Thanks to iBeacons, we do not have to depend on users to identify themselves on a map, or take a particular action; applications can now be triggered by proximity to an iBeacon in the physical world.

Applications for iBeacons

Aerohive offers an iBeacon-enabled application called HivePass. HivePass is powerered by PassForce and gives retailers an easy way to leverage an existing app called Passbook to deliver a personalized loyalty app experience. HivePass is part of the Aerohive Personalized Engagement ecosystem, which empowers retailers to provide a next-generation customer experience with the combination of sophisticated Wi-Fi along with best-of-breed applications and partners.

Although the iBeacon technology is mostly discussed in retail, it is potentially useful in a wide variety of contexts. Organizations can use proximity information to improve location awareness in areas where technologies traditionally have not supported precise location identification.

Possible applications for indoor proximity include:
- Map assistance- beacons can help a device accurately identify its surroundings in an environment and help provide clear directions to a desired destination
- Transit assistance- beacons could automatically assist travelers in finding a boarding gate, calling up a relevant e-ticket, etc.
- Museum guides- museums can build apps for patrons including direction guides based on current proximity and extended informational pop-ups when near major exhibitions
- Retail store enhancement- beacons could facilitate the sending of a coupon or notice to the user's device when they are standing near a display

Possible applications for proximity-triggered actions in various environments include:
- Mobile advertisements- when a device gets close to a display, an advertisement (coupon, notification of a sale, or an offer to receive more information) gets pushed to that device
- Ticket validation- integrated mobile ticketing services at transportation facilities, sporting events, movie theaters, etc.
- Patient information integration- iBeacons on patient ID bands can be used to automatically pull up records in medical or assisted living facilities

Benefits

What does this mean for your existing wireless network and your business or organizational goals?

iBeacons create new and innovative ways to use mobile device signals for proximity and presence detection, analytics and event triggering. The new partnership between Radius Networks and Aerohive delivers an IoT solution to provide advanced insights and mobile experience personalization.

The proximity engagement services enable organizations to present their customers/mobile device users with real-time, targeted offers, personalized services and relevant, meaningful interactions based on their nearness to specific point-of-interest opportunities. In the retail space, the proximity analytics services made possible by this partnership help to identify customer shopping behaviors and provide reliable metrics on property utilization. This enables more informed decisions on sales and marketing strategies that boost property performance. Combining Aerohive's Wi-Fi infrastructure with RadBeacon proximity beacons provides a flexible and scalable foundation for integrating next-generation experience, enhancement, engagement and informative micro-location functionality. Because it is based on actual behavior in real time, this information can help retailers to build a gradual, genuine relationship with the customer, which increases the likelihood of their engagement. Depending on the industry or deployment parameters, this can lead to increased sales, customer satisfaction and retention, or enhanced user experience.

Mobile Experience Personalization & Targeting

Integrating Radius Network Technology with Aerohive AP's

Aerohive's portfolio of access points (with USB integration), as well as its BR200 branch router, now support Radius' RadBeacon. The Aerohive access points can be embedded with small, Radbeacon Bluetooth chips via powered USB ports, enabling them to act as Bluetooth transmitters. Because iBeacons are relatively simple devices with a low per-unit cost, the vital information that they deliver can be delivered at a surprisingly affordable cost.

Summary

Although many wireless vendors offer some sort of Wi-Fi based locationing services, those services typically rely on an end user joining the Wi-Fi network. Aerohive's cloud-managed Wi-Fi equipped with Radius' proximity beacons allows a network to offer relative position mapping for mobile device users who don't necessarily join the network.

Organizations have been looking for new technologies to enable them to use real-time data to better engage with their end users and drive relevance so they can offer better services and customized experiences. Aerohive's partnership with Radius Networks has delivered the world's first integrated enterprise Wi-Fi iBeacon-enabled solution; facilitating the delivery of a solution that provides advanced insight into mobile device user's behavior and mobile experience personalization. This cost effective improvement in location based interactions furthers our transition into a truly connected world.

About Aerohive

Aerohive (NYSE: HIVE) unleashes the power of enterprise mobility. Aerohive's technology enables organizations of all sizes to use mobility to increase productivity, engage customers and grow their business. Deployed in over 16,000 customers worldwide, Aerohive's proprietary mobility platform takes advantage of the cloud and a distributed architecture to deliver scalable, simplified, secure and cost-effective networks. Aerohive was founded in 2006 and is headquartered in Sunnyvale, Calif. For more information, please visit www.aerohive.com, call us at 408-510-6100, follow us on Twitter @Aerohive, subscribe to our blog, join our community or become a fan on our Facebook page.

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